

3. Solve the following problems:

- a. A wave has a frequency of 150Hz. What is its period?

$$0.0067 \text{ s}$$

- b. A wave cycle repeats every 0.003 seconds. What is its frequency?

$$333.3 \text{ Hz}$$

- c. A wave travels at 650m/s and has a frequency of 600Hz. What is its wavelength?

$$1.083 \text{ m}$$

- d. You shout at the top of a mountain 1500m away from me. If the speed of sound is 343m/s, how long until I hear you?

$$4.37 \text{ sec.}$$

- e. A sound wave travels at 343m/s with an initial frequency f . If the frequency is doubled, what happens to the wavelength?

$$\frac{1}{2} \lambda$$

- f. A ray of blue light ($\lambda=610\text{nm}$) is being shone on a thin film of gasoline ($n=1.21$) atop a puddle of water ($n=1.33$). Find the minimum three depths of the gasoline ($m=1,2,3$)

$$d_1 = 252 \text{ nm} \quad d_2 = 504.1 \text{ nm} \quad d_3 = 756.2 \text{ nm}$$

- g. A green light of wavelength 524nm is reflected from a soapy film ($n=1.12$). What are the three minimum thicknesses of the oil where the green light will be brightest?

$$d_1 = 233.9 \text{ nm} \quad d_2 = 467.8 \text{ nm} \quad d_3 = 701.7 \text{ nm}$$

- h. Blue light (502nm) is shined on a thin film of gasoline ($n=1.23$). What are the three minimum thicknesses of the gasoline where the blue light will be strongly reflected?

$$d_1 = 204 \text{ nm} \quad d_2 = 408 \text{ nm} \quad d_3 = 612.2 \text{ nm}$$

- i. In an experiment where light with a wavelength of 522nm is shone through slits a difference of 5mm apart, alternating light and dark stripes were formed on a screen 67cm away. What happens if the distance between the slits is increased to 8mm?

$$\uparrow d = \downarrow \theta, \quad \theta \downarrow = \text{squished pattern}$$

- j. With two slits 0.12 mm apart, and a screen at a distance of 80 cm, the third bright line to one side of center in an interference pattern is found to be displaced 9.0 mm from the central line. What happens if the screen is moved further away?

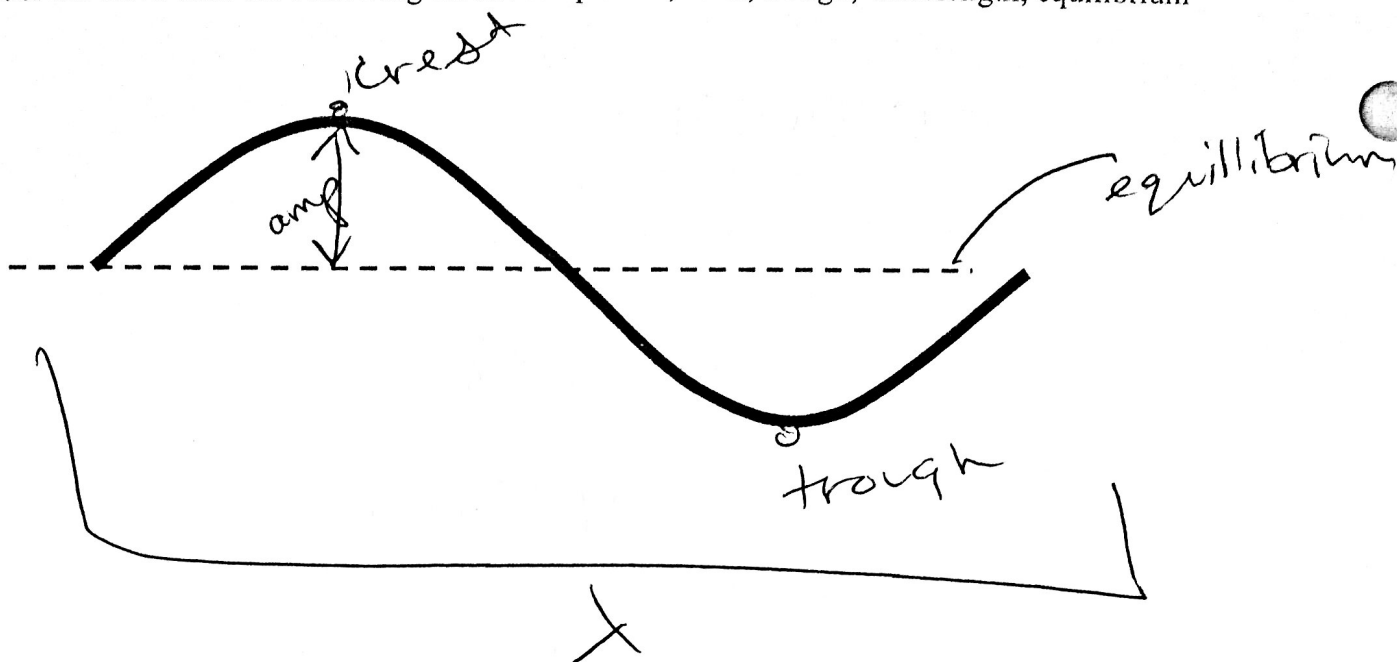
$$\uparrow L = \text{stretched}$$



- k. In an interference experiment, red light passes through a double slit. On a screen 1.5 m away, the distance between the 0th and the 10th dark bands is 2.0 cm. What happens if the wavelength is decreased?

$$\downarrow \lambda = \downarrow \theta, \quad \theta \downarrow = \text{squished pattern}$$

4. Label the wave with the following labels: Amplitude, crest, trough, wavelength, equilibrium



5. Complete the following chart:

Harmonic	Wave	Wave cycles	Overtone
1 st		0.5	fundamental freq.
2 nd		1	1 st
3 rd		1.5	2 nd
4 th		2	3
5 th		2.5	4 th
7 th		3.5	6 th